

Seismic Analysis of The National Compact Stellarator Experiment (NCSX)

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Seismic analysis and qualification of NCSX is presented. DOE requirements as outlined in DOE-STD-1020-2002 are followed for determination of the necessity for seismic qualification of the stellarator and its related systems. IBC-2000 is followed for the qualification requirements. The stellarator presents minimal occupational hazards and hazards to the public. The qualification effort is intended to preserve the viability of continuing the experiment after an earthquake, and to explore the sensitivity of the design to dynamic loading from sources other than normal operation. A response spectra modal analysis has been employed. The model is an assemblage of the simpler models of the vessel, and modular coil shells; being employed to qualify these components for normal operational loading. Outer TF and PF coil models and models of the cold mass supports have been generated and added to form a complete model of the stellarator system. The scale of the model is limited by the computational capacity of the windows/Intel system used for the analysis, and the efforts to control runtimes and file sizes are described. Much of the stellarator is robust to resist normal Lorentz forces. Areas sensitive to lateral loads and dynamic application of non-Lorentz loading, include the nested cylinder cold mass support columns, cantilevered vessel ducts, and the radial guides connecting the vessel ducts and modular coil shell. Loads on these structures are quantified, and design adequacy is assessed. .